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IS 7742 (1975): Synthetic emulsion resin binders [CHD 17: Leather, Tanning Materials and Allied Products]



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Indian Standard

SPECIFICATION FOR
SYNTHETIC EMULSION RESIN BINDERS

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Indian Standard

SPECIFICATION FOR SYNTHETIC EMULSION RESIN BINDERS

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Indian Standard

SPECIFICATION FOR SYNTHETIC EMULSION RESIN BINDERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 August 1975, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

0.2 Synthetic resin binders are used as film forming binders in various stages of finishing leathers, for example, bottom stock, pigment coat, top coat, etc, either alone or in admixture with protein binders.

0.3 The synthetic resin binders are manufactured and marketed in various grades and qualities, yielding hard to soft films and used in varying formulations for finishing different types of leather.

0.4 Realizing the wide application of this important auxiliary in the modern trend of leather finishing, the Sectional Committee felt it necessary to formulate this standard for the guidance of the leather finishing industry.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements, methods of sampling and test for synthetic emulsion resin binders for leather finishing.

1.1.1 This standard is not intended to cover resin emulsions which are used for tanning and impregnation.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 1640-1960† and the following shall apply.

*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to hides, skin and leather.

2.1.1 Resin Binder — Various synthetic polymer resins in emulsion state, prepared by emulsion polymerization of vinyl and/or other monomers.

3. REQUIREMENTS

3.1 Physico-Chemical Characteristics

3.1.1 Colour and Appearance — The material when examined visually shall be opaque to translucent and free-flowing. It shall also be free from any sediments and foreign matter.

3.1.2 pH — The pH of the material when tested as prescribed in IS: 5914-1970* shall be as agreed to between the purchaser and the supplier, but shall not vary more than ± 0.5 of the agreed value.

3.1.3 Total Solids — The manufacturer shall indicate the solid content which when tested in accordance with the test prescribed in A-1 shall conform within a tolerance of ± 1 percent.

3.1.4 Residual Free Monomers — The material shall be free from residual free monomers when tested in accordance with A-2.

3.1.5 Stability to Specific Chemicals and Leather Finishing Formulations — The material shall be considered satisfactory if it passes the test prescribed in A-3.

3.1.6 Storage Stability — The material when kept in sealed original containers at $70 \pm 2^\circ\text{C}$ for 72 hours shall be stable without any breaking or coagulation of the emulsion (see Note).

NOTE — Such a material shall be stable at $27 \pm 2^\circ\text{C}$ when stored for a minimum period of 6 months from the date of manufacture.

3.1.7 Freeze-Thaw Stability — The material when tested in accordance with A-4 shall pass the test.

3.1.8 Cold Crack Resistance — The material in the satisfactory concentration of finishing formulation shall not crack at -20°C when tested in accordance with A-5.

3.1.9 Solvent Tolerance Test — The material shall pass the test as prescribed in A-6.

3.2 Physical Characteristics of Resin Emulsion Film — The film of the material shall pass the test as prescribed in A-7.

3.3 Application Characteristic — The material in the satisfactory concentration of finishing formulation shall easily wet the surface without any froth or foam during brushing on to the leather surface.

*Methods of physical testing of leather.

4. PACKING AND MARKING

4.1 Packing — Unless otherwise specified the material shall be packed in metal containers lacquered inside with a suitable chemical-resistant material.

4.2 Marking — Each container shall be marked with the following:

- a) Name of the material;
- b) Name of the manufacturer and/or trade-mark, if any;
- c) Volume of the material;
- d) Month and year of manufacture; and
- e) Instructions for preparing the leather finishing formulation.

4.2.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 Representative samples of the material shall be drawn as prescribed in 3 of IS : 101-1964*.

APPENDIX A

(*Clauses 3.1 and 3.2*)

TESTS FOR SYNTHETIC EMULSION RESIN BINDER AND ITS FILM

A-1. DETERMINATION OF TOTAL SOLIDS

A-1.0 Outline of the Method — The filtered emulsion is heated in an aluminium dish at $100 \pm 2^\circ\text{C}$ for about $1\frac{1}{2}$ hours and weighed.

A-1.1 Procedure — Filter the emulsion through a funnel containing glass wool and collect the filtrate in a weighed aluminium dish. Collect about 2 to 3 g of filtrate in the dish and weigh accurately. Heat the dish

*Methods of test for ready mixed paints and enamels (*second revision*).

and contents in an oven maintained at $100 \pm 2^{\circ}\text{C}$ for about $1\frac{1}{2}$ hours, till constant mass is obtained. Cool the dish to room temperature and weigh.

A-1.2 Calculation

$$\text{Total solids, percent by mass} = \frac{m}{M} \times 100$$

where

m = mass in g of the residue, and

M = mass in g of the sample taken for the test.

A-2. DETERMINATION OF RESIDUAL FREE MONOMERS

A-2.0 Outline of the Method — The emulsion is diluted with an equal volume of water. Aqueous hydroquinone and antifoaming agents are also added and the mixture is distilled. The distillate is collected in a graduated cylinder and examined for the presence of organic layer.

A-2.1 Apparatus

A-2.1.1 Distillation Assembly — modified Dean-Stark apparatus.

A-2.2 Reagents

A-2.2.1 Aqueous Hydroquinone Solution — 5 percent (m/v).

A-2.2.2 Antifoaming Agent — silicone type.

A-2.3 Procedure — Dilute 100 ml of the material with equal amount of water. Add 2 ml of aqueous hydroquinone solution and 0.5 ml of antifoaming agent. Take this in a distilling flask and distil the contents. Collect the distillate in a graduated cylinder, provided with recirculating provision. Recirculate the lower water layer to distilling flask and continue the distillation till the upper organic layer remains constant. This gives the percent monomer present in the emulsion. The material shall be deemed to have passed the test if no organic (upper) layer is present.

A-3. TEST FOR STABILITY TO SPECIFIC CHEMICALS AND LEATHER FINISHING FORMULATIONS

A-3.0 Outline of the Method — The resin emulsion is treated with the specific chemicals and leather finishing formulations and the emulsion is examined for any break or curdling.

A-3.1 Reagents

A-3.1.1 Sodium Chloride Solution — 5 percent (m/v)

A-3.1.2 Calcium Chloride Solution — 5 percent (m/v).

A-3.1.3 Formic Acid Solution — 5 percent (m/v).

A-3.1.4 Sodium Carbonate Solution — 5 percent (m/v).

A-3.1.5 Ethyl Alcohol — 5 percent (m/v).

A-3.1.6 Isopropyl Alcohol — 5 percent (m/v).

A-3.2 Procedure — Prepare the emulsion to contain 10 percent solid content. Take 3 ml for test with each of the above chemicals. To emulsion in a test tube add 10 ml of the test reagent, mix well and leave at $27 \pm 2^\circ\text{C}$ for 5 minutes. Examine the material at the end of this period for stability. The material shall be deemed to have passed the test in respect of the particular test reagent, if the material shows no break or curdling.

A-4. TEST FOR FREEZE-THAW STABILITY

A-4.0 Outline of the Method — The emulsion is subjected to a cycle consisting of keeping at -10°C for 18 hours and slowly bringing it to 25°C . Then the material is examined for change in viscosity and coagulation.

A-4.1 Procedure — Dilute the material to give 20 percent (m/v) solid content. Take this emulsion in a tin provided with a tight lid and coated inside with a chemical resistant lacquer. Replace the lid. Keep the tin in a thermostat at a temperature of $-10 \pm 2^\circ\text{C}$ and keep at this temperature for 18 hours. Then raise slowly the temperature to $25 \pm 2^\circ\text{C}$. This constitutes one cycle. Examine the contents for change in viscosity, which should not show a change by more than 50 percent of the original, and for coagulation. Subject the material to 3 such cycles and examine at the end for viscosity and coagulation.

A-4.1.1 The material shall be deemed to have passed the test if it has withstood 3 cycles satisfactorily.

A-5. TEST FOR COLD CRACK RESISTANCE

A-5.0 Outline of the Method — The material in the satisfactory concentration of finishing formulations is subjected to subzero temperature, after application on test specimen and examined for any crack.

A-5.1 Apparatus — The testing apparatus consists of two parallel revolving cylinders, 25 mm in diameter and made of non-compressible material (glass, steel, hard PVC). The distance between the cylinders is variable.

A-5.2 Test Specimens — For preparing test specimen, cut pieces of size 15×150 mm from a sample of garment leather ready for finishing. Apply two coats of the finishing formulation prepared with the material to be tested on the grain side, the second one being applied after the first coat dries up.

A-5.3 Conditioning — Condition the specimens at $27 \pm 2^{\circ}\text{C}$ and 65 percent relative humidity for 24 hours before the test is carried out.

A-5.4 Procedure — Adjust the distance between the rollers to three times the thickness of the leather to be tested. Bend the leather with the finished side on the outer side, so that the two ends of the strip meet. Push the two ends through the space between the cylinders and fasten in a clamping device closely behind the cylinders. Thus, the leather strip forms a drop-shaped loop. Adjust the test chamber (refrigerator) to -20°C . Then, place the test apparatus with the leather test specimen in the test chamber and cool down to the test temperature for 30 minutes. Take it out and adjust the cylinders so that the leather loop is pulled through between the cylinders and then compressed in a space equal to the leather thickness. Take out the leather piece and check the test area for cracks in the finish coats. If the leather is resistant to cracking at the temperature tested, the test is repeated at a still lower temperature of 5°C . Repeat the test thrice with three test specimens. Report the results for each test temperature.

A-6. TEST FOR SOLVENT TOLERANCE

A-6.0 Outline of the Method — The material is mixed with ethanol or isopropyl alcohol and examined for any deterioration like coagulation, thickening, etc.

A-6.1 Reagents

A-6.1.1 Ethyl Alcohol — conforming to IS : 323-1959*.

A-6.1.2 Isopropyl Alcohol — conforming to IS : 2631-1964†.

A-6.2 Procedure — Take 100 ml of the material in a clean 250-ml beaker. Add 6 ml of ethyl alcohol with stirring. Ignore any initial local thickening. Examine the contents after a few minutes for coagulation, thickening, etc. Repeat the test using isopropyl alcohol also. The material shall be deemed to have passed the test if the test sample gives a smooth dispersion on dilution with ethyl alcohol and isopropyl alcohol.

A-7. TEST FOR PHYSICAL CHARACTERISTICS OF RESIN EMULSION FILM

A-7.0 Outline of the Method — A coat of the material is applied on a tin-plated mild steel panel and the film formed is tested for flexibility and adhesion.

*Specification for rectified spirit (revised).

†Specification for isopropyl alcohol.

A-7.1 Procedure

A-7.1.1 Apply a coat of the material on a tin-plated panel to give a film thickness of 50 to 75 microns and dry for 48 hours. Bend the film over a mandrel of 6.25 mm diameter as prescribed in 16 of IS : 101-1964*. Examine the film and report failure of the test if there be any sign of visible damage or detachment of film.

A-7.1.2 Pour some quantity of well mixed emulsion in a cavity of size $12.0 \times 5.0 \times 0.1$ cm made of glass plates. Place the cavity in a horizontal position and dry at $27 \pm 2^\circ\text{C}$. Peel off the film from the plate for testing. The material shall be deemed to have passed the test if it does not crack or detach when tested as in A-7.1.1, and when tested as in A-7.1.2, the film is transparent, glossy and free from haziness.

*Methods of test for ready mixed paints and enamels (*second revision*).

INDIAN STANDARDS

ON

LEATHER

IS :

- 575-1956 Chrome belt lace leather
- 576-1975 Glazed kid for shoe uppers (*first revision*)
- 577-1954 Upholstery leather
- 578-1971 Full-chrome upper leather (*second revision*)
- 579 (Part I)-1973 Sole leather: Part I Vegetable tanned sole leather (*second revision*)
- 579 (Part II)-1973 Sole leather: Part II Water-resistant vegetable tanned sole leather (*second revision*)
- 580-1973 Harness leather (*second revision*)
- 581-1962 Vegetable tanned hydraulic leather (*revised*)
- 582-1970 Methods of chemical testing of leather (*first revision*)
- 622-1956 Russet leather
- 1016-1956 Methods of sampling and test for oil tanned leathers
- 1017-1966 Chamois leather (*first revision*)
- 1636-1960 Chrome waxed sole leather
- 1637-1960 Cycle saddle leather
- 1639-1960 East India tanned kips and skins
- 1640-1960 Glossary of terms relating to hides, skin and leather
- 2276-1962 Vegetable and aluminium tanned snakeskins
- 2545-1963 Vegetable tanned lizardskins
- 2698-1964 Leather roller skins
- 2954-1964 Vegetable tanned leather for belting
- 2960-1964 Bookbinding leather
- 2961-1973 Chrome retan finished upper leather (*first revision*)
- 3020-1964 Leathers for oil seals and washers
- 3840-1966 Lining leathers
- 3946-1966 Leather for leg-guard
- 3982-1966 Sheepskin leather for orthopaedic linings
- 3983-1966 Goatskin parchment for orthopaedic purposes
- 3985-1966 Leather for rugby ball
- 4102-1967 Leather for shuttlecock caps
- 4191-1967 Leather for volleyball
- 4207-1967 Leather for football
- 4553-1967 Leather for cricket ball
- 5024-1968 Buffalo-butt leather for knee bushings
- 5034-1968 Chrome goatskin in wet-blue condition
- 5570-1969 Pickled goatskins
- 5597-1970 Leather for boxing gloves
- 5609-1970 Leather for hockey ball
- 5677-1970 Shoe upper leather for direct moulding processes
- 5712-1970 Slickers for leather industry
- 5866-1970 Chrome leather for high altitude gloves
- 5867-1970 Leatherboards for insoles
- 5868-1969 Method of sampling for leather
- 5914-1970 Methods of physical testing of leather
- 6191-1971 Methods of microbiological colour fastness and microscopical tests for leather

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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